PATENT COOPERATION TREATY

PCT

TRANSLATION INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference NEC04P229			ce	FOR FURTHER A	ACTION	See Form PCT/IPEA/416		
International application No.				International filing da	ate (day/month/year)	Priority date (day/month/year)		
PCT/JP2005/001389			389	01.02.200	5	23.02.2004		
Internati	ional Pater	nt Classification	(IPC) or nati	onal classification and	IPC			
F04	F04B9/00(2006.01), H01L23/473(2006.01)							
Applica NEC		PORATIO	N					
1.	1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.							
2.	This RE	PORT consists	of a total of _	17	sheets, including	g this cover sheet.		
3.	This rep	ort is also accor	npanied by Al	NNEXES, comprising:				
	a. 🛚	(sent to the	applicant and	to the International Bu	ureau) a total of	sheets, as follows:		
	sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).							
	sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental							
	, \square	Box.	T	D 1) 4 1 6		6.1.4		
	b	(sent to the t	iniernationat i	<i>Bureau oniy)</i> а totai oi	(indicate type and number	r of electronic carrier(s))		
	, containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see							
				rative Instructions).		and the section of th		
4.	This rep	ort contains ind	ications relati	ng to the following iter	ns:			
		Box No. I	Basis of the	report				
		Box No. II	Priority					
		Box No. III	Non-establi	shment of opinion with	regard to novelty, inventi	ive step and industrial applicability		
		Box No. IV	Lack of unit	ty of invention				
	Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement							
	Box No. VI Certain documents cited			uments cited				
	Box No. VII Certain defects in the international application							
	Box No. VIII Certain observations on the international application							
Date of submission of the demand				Date of completion of thi	is report			
Name and mailing address of the IPEA/JP				Authorized officer				
Facsimile No.				Telephone No.				

International application No.

PCT/JP2005/001389

Box	No. I	Basis of the report		
1.		h regard to the language, this report is based on the internatio cated under this item.	nal application in the language in which	h it was filed, unless otherwise
		This report is based on translations from the original langua	·	,
		which is the language of a translation furnished for the purp international search (Rule 12.3 and 23.1(b))	oses of:	
		publication of the international application (Rule 12.4)	
		international preliminary examination (Rule 55.2 and/	(or 55.3)	
2.	rece	h regard to the elements of the international application, this iving Office in response to an invitation under Article 14 ar report):		
		the international application as originally filed/furnished		
	\boxtimes	the description:		
		pages _ 1-11		as originally filed/furnished
		pages*	received by this Authority on	
		pages*	received by this Authority on	
	\boxtimes	the claims:		
		nos.		as originally filed/furnished
		nos.*	as amended (together with	h any statement) under Article 19
		nos.*1-14	received by this Authority on13	.07.2005
		nos.*	received by this Authority on	
	\bowtie	the drawings:		
		sheets 1-9		as originally filed/furnished
		sheets*	received by this Authority on	
	_	sheets*	received by this Authority on	
		a sequence listing and/or any related table(s) – see Supplem	ental Box Relating to Sequence Listing	y ,
3.		The amendments have resulted in the cancellation of:		
		the description, pages		
		the claims, nos.		
		the drawings, sheets/figs		
		the sequence listing (specify):		
		any table(s) related to sequence listing (specify):		
4.		This report has been established as if (some of) the amend they have been considered to go beyond the disclosure as fi		
		the description, pages		
		the claims, nos.		
		the drawings, sheets/figs		
		the sequence listing (specify):		
		any table(s) related to sequence listing (specify):		
*	If ite	em 4 applies, some or all of those sheets may be marked "sup	erseded."	

International application No.	
PCT/JP2005/001389	

Box		int under Article 35(2) with regard to novelty, inventive step or industrial applicability; anations supporting such statement	
1.	Statement		
	Novelty (N)	Claims _ 1 - 1 4	YES
		Claims	
	Inventive step (IS)	Claims 2, 9	VES
		Claims 2, 9 Claims 1, 3-8, 10-14	
	Industrial applicability (IA)	Chrima 1 – 1 4	VEC
		Claims 1-14 Claims	
2.	Citations and explanations (Rule		
		crofilm of the specification and drawings	
		nexed to the Japanese Utility Model	
	Ар	plication No. 189816/1987 (Laid-open No.	
	93	379/1989) (Misuzu Eric Co., Ltd.), 20 June	
	19	89	
	Document 2: JP	4-183978 A (Seiko Epson Corporation), 30	
	Ju	ne 1992	
	Document 3: JP	2003-120541 A (Matsushita Electric	
	In	dustrial Co., Ltd.), 23 April 2003	
	Document 4: JP	2001-355574 A (Matsushita Electric	
	In	dustrial Co., Ltd.), 26 December 2001	
	Document 5: JP	9-324764 A (Matsushita Refrigeration Co.),	
	16	December 1997	
	Document 6: JP	2003-29879 A (Hitachi, Ltd.), 31 January	
	20	03	
	Document 7: JP	2002-163042 A (Toshiba Corporation), 7	
	Ju	ne 2002	
	Document 8: JP	2003-121254 A (Yasuhiko Tawara), 23 April	
	20	03	
	The invent	ion set forth in claim 1 does not involve	
	an inventive st	ep in the light of documents 1 and 2 cited	
	in the internat	ional search report and newly cited	
1			

document 8.

In the light of document 1 (description, page 6, lines 6 to 10), the piezoelectric pump driving circuit set forth in document 1 is understood to have a sine wave transmitting means (8) and amplifying means (10, 11).

Although document 1 does not indicate that these amplifying means (10, 11) are driven by a high voltage generated by the voltage boosting means, in driving an amplifying means it is a known technique to drive a circuit with a high voltage generated by a voltage-boosting means which converts a low-voltage power supply into a high voltage, as set forth in document 2 (page 2, lower left column, line 7 to upper right column, line 1).

In addition, in amplifying a signal which drives a piezoelectric element, it is a known technique to use a Class D amplifier and low pass filter, as set forth in document 8 (paragraphs [0024] to [0026]) for example, therefore it would be easy for a person skilled in the art to constitute a signal amplifying means to use a Class D amplifier and a low pass filter.

The inventions set forth in claims 2 and 9 are not disclosed in any of the documents cited in the international search report, and are therefore novel and involve an inventive step. In particular, none of the documents discloses or suggests a controlling means which controls fluctuations in frequency when starting up a sine wave oscillating means using three or more different frequencies.

The invention set forth in claim 3 does not involve an inventive step in the light of documents 1 to 3 cited

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

in the international search report and newly cited document 8.

In the light of document 1 (description, page 6, lines 6 to 10), the piezoelectric pump driving circuit is understood to have a sine wave generating means (8) and amplifying means (10, 11).

Although document 1 does not indicate that these amplifying means (10, 11) are driven by a high voltage generated by the voltage boosting means, in driving an amplifying means it is a known technique to drive a circuit with a high voltage generated by a voltage-boosting means which converts a low-voltage power supply into a high voltage, as set forth in document 2 (page 2, lower left column, line 7 to upper right column, line 1).

In addition, in amplifying a signal which drives a piezoelectric element, it is a known technique to use a Class D amplifier and low pass filter, as set forth in document 8 (paragraphs [0024] to [0026]) for example, therefore it would be easy for a person skilled in the art to constitute a signal amplifying means to use a Class D amplifier and a low pass filter.

In addition, discharging foam by controlling fluctuations in frequency is a known technique, as set forth in document 3 (paragraph [0031], for example), and the problem that foam exists at startup is a widely known technical matter in the technical field relating to liquid pumps, therefore it would be easy for a person skilled in the art to constitute an invention so as to vary the frequency when starting up a pump.

The invention set forth in claim 4 does not involve an inventive step in the light of documents 1, 2 and 4

cited in the international search report.

In the light of document 1 (description, page 6, lines 6 to 10), the piezoelectric pump driving circuit is understood to have a sine wave generating means (8) and amplifying means (10, 11).

Although document 1 does not indicate that these amplifying means (10, 11) are driven by a high voltage generated by the voltage boosting means, in driving an amplifying means it is a known technique to drive a circuit with a high voltage generated by a voltage-boosting means which converts a low-voltage power supply into a high voltage, as set forth in document 2 (page 2, lower left column, line 7 to upper right column, line 1).

In addition, document 4 (paragraph [0031]) indicates that the driving voltage which drives a piezoelectric transducer is varied according to the temperature detected by a temperature sensor (26), therefore it would be easy for a person skilled in the art to provide a controlling means which adjusts the signal amplitude of a sine wave transmitting means according to the temperature detected by a temperature detecting means.

The invention set forth in claim 5 does not involve an inventive step in the light of documents 1, 2 and 4 cited in the international search report and newly cited document 8.

In the light of document 1 (description, page 6, lines 6 to 10), the piezoelectric pump driving circuit set forth in document 1 is understood to have a sine wave transmitting means (8) and amplifying means (10, 11).

Although document 1 does not indicate that these amplifying means (10, 11) are driven by a high voltage

generated by the voltage boosting means, in driving an amplifying means it is a known technique to drive a circuit with a high voltage generated by a voltage-boosting means which converts a low-voltage power supply into a high voltage, as set forth in document 2 (page 2, lower left column, line 7 to upper right column, line 1).

In addition, in amplifying a signal which drives a piezoelectric element, it is a known technique to use a Class D amplifier and low pass filter, as set forth in document 8 (paragraphs [0024] to [0026]) for example, therefore it would be easy for a person skilled in the art to constitute a signal amplifying means to use a Class D amplifier and a low pass filter.

In addition, document 4 (paragraph [0031]) indicates that the driving voltage which drives a piezoelectric transducer is varied according to the temperature detected by a temperature sensor (26), therefore it would be easy for a person skilled in the art to provide a controlling means which adjusts the signal amplitude of a sine wave transmitting means according to the temperature detected by a temperature detecting means.

The invention set forth in claim 6 does not involve an inventive step in the light of documents 1 to 4 cited in the international search report.

In the light of document 1 (description, page 6, lines 6 to 10), the piezoelectric pump driving circuit set forth in document 1 is understood to have a sine wave transmitting means (8) and amplifying means (10, 11).

Although document 1 does not indicate that these amplifying means (10, 11) are driven by a high voltage generated by the voltage boosting means, in driving an

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amplifying means it is a known technique to drive a circuit with a high voltage generated by a voltage-boosting means which converts a low-voltage power supply into a high voltage, as set forth in document 2 (page 2, lower left column, line 7 to upper right column, line 1).

In addition, discharging foam by controlling fluctuations in frequency is a known technique, as set forth in document 3 (paragraph [0031], for example), and the problem that foam exists at startup is a widely known technical matter in the technical field relating to liquid pumps, therefore it would be easy for a person skilled in the art to constitute an invention so as to vary the frequency when starting up a pump.

In addition, document 4 (paragraph [0031]) indicates that the driving voltage which drives a piezoelectric transducer is varied according to the temperature detected by a temperature sensor (26), therefore it would be easy for a person skilled in the art to provide a controlling means which adjusts the signal amplitude of a sine wave transmitting means according to the temperature detected by a temperature detecting means.

The invention set forth in claim 7 does not involve an inventive step in the light of documents 1 to 4 cited in the international search report and newly cited document 8.

In the light of document 1 (description, page 6, lines 6 to 10), the piezoelectric pump driving circuit set forth in document 1 is understood to have a sine wave transmitting means (8) and amplifying means (10, 11).

Although document 1 does not indicate that these amplifying means (10, 11) are driven by a high voltage

generated by the voltage boosting means, in driving an amplifying means it is a known technique to drive a circuit with a high voltage generated by a voltage-boosting means which converts a low-voltage power supply into a high voltage, as set forth in document 2 (page 2, lower left column, line 7 to upper right column, line 1).

In addition, in amplifying a signal which drives a piezoelectric element, it is a known technique to use a Class D amplifier and low pass filter, as set forth in document 8 (paragraphs [0024] to [0026]) for example, therefore it would be easy for a person skilled in the art to constitute a signal amplifying means to use a Class D amplifier and a low pass filter.

In addition, discharging foam by controlling fluctuations in frequency is a known technique, as set forth in document 3 (paragraph [0031], for example), and the problem that foam exists at startup is a widely known technical matter in the technical field relating to liquid pumps, therefore it would be easy for a person skilled in the art to constitute an invention so as to vary the frequency when starting up a pump.

In addition, document 4 (paragraph [0031]) indicates that the driving voltage which drives a piezoelectric transducer is varied according to the temperature detected by a temperature sensor (26), therefore it would be easy for a person skilled in the art to provide a controlling means which adjusts the signal amplitude of a sine wave transmitting means according to the temperature detected by a temperature detecting means.

The invention set forth in claim 8 does not involve an inventive step in the light of documents 1, 2 and 4

cited in the international search report, and newly cited document 8.

In the light of document 1 (description, page 6, lines 6 to 10), the piezoelectric pump driving circuit set forth in document 1 is understood to have a sine wave transmitting means (8) and amplifying means (10, 11).

Although document 1 does not indicate that these amplifying means (10, 11) are driven by a high voltage generated by the voltage boosting means, in driving an amplifying means it is a known technique to drive a circuit with a high voltage generated by a voltage-boosting means which converts a low-voltage power supply into a high voltage, as set forth in document 2 (page 2, lower left column, line 7 to upper right column, line 1).

In addition, in amplifying a signal which drives a piezoelectric element, it is a known technique to use a Class D amplifier and low pass filter, as set forth in document 8 (paragraphs [0024] to [0026]) for example, therefore it would be easy for a person skilled in the art to constitute a signal amplifying means to use a Class D amplifier and a low pass filter.

Moreover, a cooling system having a heat sink, a radiator and a piezoelectric pump is known, as set forth in document 4.

The invention set forth in claim 10 does not involve an inventive step in the light of documents 1 to 4 cited in the international search report and newly cited document 8.

In the light of document 1 (description, page 6, lines 6 to 10), the piezoelectric pump driving circuit set forth in document 1 is understood to have a sine wave

transmitting means (8) and amplifying means (10, 11).

Although document 1 does not indicate that these amplifying means (10, 11) are driven by a high voltage generated by the voltage boosting means, in driving an amplifying means it is a known technique to drive a circuit with a high voltage generated by a voltage-boosting means which converts a low-voltage power supply into a high voltage, as set forth in document 2 (page 2, lower left column, line 7 to upper right column, line 1).

In addition, in amplifying a signal which drives a piezoelectric element, it is a known technique to use a Class D amplifier and low pass filter, as set forth in document 8 (paragraphs [0024] to [0026]) for example, therefore it would be easy for a person skilled in the art to constitute a signal amplifying means to use a Class D amplifier and a low pass filter.

In addition, discharging foam by controlling fluctuations in frequency is a known technique, as set forth in document 3 (paragraph [0031], for example), and the problem that foam exists at startup is a widely known technical matter in the technical field relating to liquid pumps, therefore it would be easy for a person skilled in the art to constitute an invention so as to vary the frequency when starting up a pump.

Moreover, a cooling system having a heat sink, a radiator and a piezoelectric pump is known, as set forth in document 4.

The invention set forth in claim 11 does not involve an inventive step in the light of documents 1, 2 and 4 cited in the international search report.

In the light of document 1 (description, page 6,

lines 6 to 10), the piezoelectric pump driving circuit set forth in document 1 is understood to have a sine wave transmitting means (8) and amplifying means (10, 11).

Although document 1 does not indicate that these amplifying means (10, 11) are driven by a high voltage generated by the voltage boosting means, in driving an amplifying means it is a known technique to drive a circuit with a high voltage generated by a voltage-boosting means which converts a low-voltage power supply into a high voltage, as set forth in document 2 (page 2, lower left column, line 7 to upper right column, line 1).

In addition, document 4 (paragraph [0031]) indicates that the driving voltage which drives a piezoelectric transducer is varied according to the temperature detected by a temperature sensor (26), therefore it would be easy for a person skilled in the art to provide a controlling means which adjusts the signal amplitude of a sine wave transmitting means according to the temperature detected by a temperature detecting means.

Moreover, a cooling system having a heat sink, a radiator and a piezoelectric pump is known, as set forth in document 4.

The invention set forth in claim 12 does not involve an inventive step in the light of documents 1, 2 and 4 cited in the international search report and newly cited document 8.

In the light of document 1 (description, page 6, lines 6 to 10), the piezoelectric pump driving circuit set forth in document 1 is understood to have a sine wave transmitting means (8) and amplifying means (10, 11).

Although document 1 does not indicate that these

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amplifying means (10, 11) are driven by a high voltage generated by the voltage boosting means, in driving an amplifying means it is a known technique to drive a circuit with a high voltage generated by a voltage-boosting means which converts a low-voltage power supply into a high voltage, as set forth in document 2 (page 2, lower left column, line 7 to upper right column, line 1).

In addition, in amplifying a signal which drives a piezoelectric element, it is a known technique to use a Class D amplifier and low pass filter, as set forth in document 8 (paragraphs [0024] to [0026]) for example, therefore it would be easy for a person skilled in the art to constitute a signal amplifying means to use a Class D amplifier and a low pass filter.

In addition, document 4 (paragraph [0031]) indicates that the driving voltage which drives a piezoelectric transducer is varied according to the temperature detected by a temperature sensor (26), therefore it would be easy for a person skilled in the art to provide a controlling means which adjusts the signal amplitude of a sine wave transmitting means according to the temperature detected by a temperature detecting means.

Moreover, a cooling system having a heat sink, a radiator and a piezoelectric pump is known, as set forth in document 4.

The invention set forth in claim 13 does not involve an inventive step in the light of documents 1 to 4 cited in the international search report.

In the light of document 1 (description, page 6, lines 6 to 10), the piezoelectric pump driving circuit set forth in document 1 is understood to have a sine wave

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transmitting means (8) and amplifying means (10, 11).

Although document 1 does not indicate that these amplifying means (10, 11) are driven by a high voltage generated by the voltage boosting means, in driving an amplifying means it is a known technique to drive a circuit with a high voltage generated by a voltageboosting means which converts a low-voltage power supply into a high voltage, as set forth in document 2 (page 2, lower left column, line 7 to upper right column, line 1).

In addition, discharging foam by controlling fluctuations in frequency is a known technique, as set forth in document 3 (paragraph [0031], for example), and the problem that foam exists at startup is a widely known technical matter in the technical field relating to liquid pumps, therefore it would be easy for a person skilled in the art to constitute an invention so as to vary the frequency when starting up a pump.

In addition, document 4 (paragraph [0031]) indicates that the driving voltage which drives a piezoelectric transducer is varied according to the temperature detected by a temperature sensor (26), therefore it would be easy for a person skilled in the art to provide a controlling means which adjusts the signal amplitude of a sine wave transmitting means according to the temperature detected by a temperature detecting means.

Moreover, a cooling system having a heat sink, a radiator and a piezoelectric pump is known, as set forth in document 4.

The invention set forth in claim 14 does not involve an inventive step in the light of documents 1 to 4 cited in the international search report and newly cited

document 8.

In the light of document 1 (description, page 6, lines 6 to 10), the piezoelectric pump driving circuit set forth in document 1 is understood to have a sine wave transmitting means (8) and amplifying means (10, 11).

Although document 1 does not indicate that these amplifying means (10, 11) are driven by a high voltage generated by the voltage boosting means, in driving an amplifying means it is a known technique to drive a circuit with a high voltage generated by a voltage-boosting means which converts a low-voltage power supply into a high voltage, as set forth in document 2 (page 2, lower left column, line 7 to upper right column, line 1).

In addition, in amplifying a signal which drives a piezoelectric element, it is a known technique to use a Class D amplifier and low pass filter, as set forth in document 8 (paragraphs [0024] to [0026]) for example, therefore it would be easy for a person skilled in the art to constitute a signal amplifying means to use a Class D amplifier and a low pass filter.

In addition, discharging foam by controlling fluctuations in frequency is a known technique, as set forth in document 3 (paragraph [0031], for example), and the problem that foam exists at startup is a widely known technical matter in the technical field relating to liquid pumps, therefore it would be easy for a person skilled in the art to constitute an invention so as to vary the frequency when starting up a pump.

In addition, document 4 (paragraph [0031]) indicates that the driving voltage which drives a piezoelectric transducer is varied according to the temperature detected by a temperature sensor (26), therefore it would

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be easy for a person skilled in the art to provide a controlling means which adjusts the signal amplitude of a sine wave transmitting means according to the temperature detected by a temperature detecting means.

Moreover, a cooling system having a heat sink, a radiator and a piezoelectric pump is known, as set forth in document 4.

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Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

- (1) The "fig. 6" set forth in paragraph [0042] is understood to be a typographical error for "fig. 5".
- (2) The "fig. 1" set forth in paragraphs [0049] and [0050] is understood to be a typographical error for "fig. 7".